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OF
CLIMATE
ON THE
HUMAN ORGANISATION.
WITH
OBSERVATIONS
ON CERTAIN
PHYSIOLOGICAL PHENOMENA.

BY
J. R. ROBERTSON, A. M. M. D.

RESIDENT PHYSICIAN FOR THE BATHS AT WIESBADEN, SPECIALLY
APPOINTED BY THE NASSAU GOVERNMENT. — CORRESPONDING
MEMBER OF VARIOUS SCIENTIFIC AND MEDICAL SOCIETIES
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JOHN CHURCHILL, PRINCES STREET.
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A. M. D.

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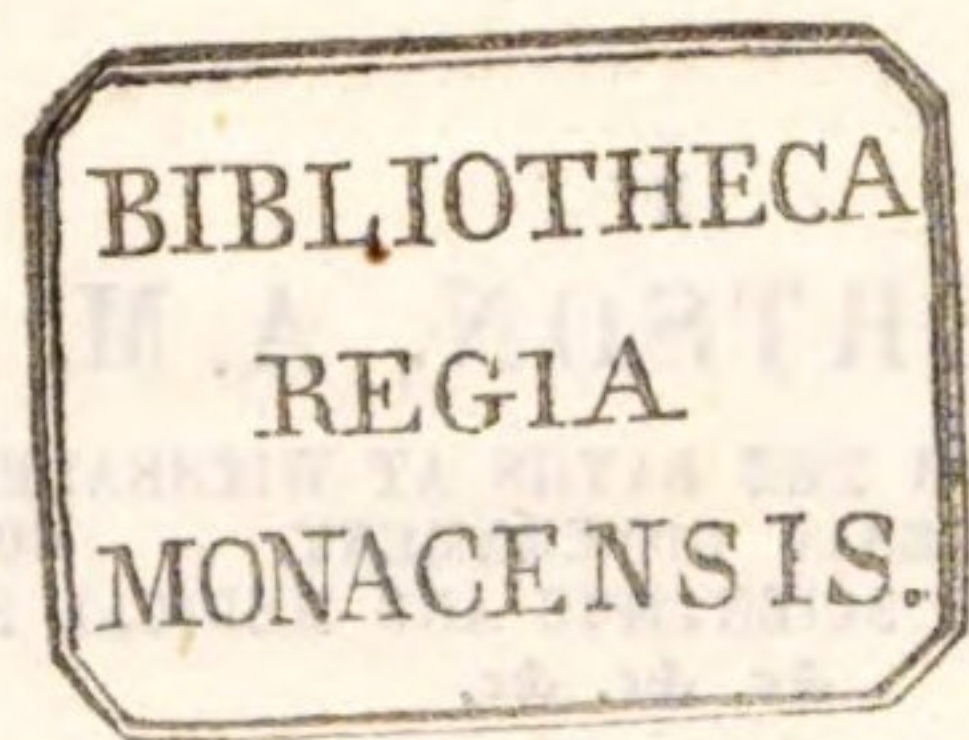
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WIESBADEN. ADOLPH STEIN.



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CHAPTER I.

Great diversity of climate. What caused by. Influence of Light and Warmth, Atmosphere, Its various phenomena. Temperature, Wind.

Pure and now purer air to the heart inspires
 Vernal delight and joy; able to drive
 All sadness but despair: now gentle gales
 Fanning their odoriferous wings dispense
 Native perfumes, and whisper whence they stole
 Those balmy spoils.

MILTON.

The subject on which I have thrown together the following observations is one, alike important to those still in the enjoyment of good health as to the invalid in search of that greatest of human blessings, and it is from the di-

versity of opinion, the singular misconception or total want of information which exists respecting it, among the majority of my countrymen who annually migrate from the shores of Great Britain, that I have been induced to lay before them the result of a very various and pretty long personal experience. In requesting the reader to accompany me on, what, a century ago, used to be dignified with the name of the Grand Tour, I promise him I will bear in mind the high pressure character of the age in which we live and although I will not say.

„I'll put a girdle round about
„the Earth in forty minutes.“

I may undertake within that time to make him acquainted, so far as my subject is concerned, with the peculiarities of the places principally resorted to in Europe.

Before proceeding to consider what especial influence is exercised on disease by the climates of particular localities, our comprehension of the question will be rendered clearer and more easy, if, we devote a few pages to the analysis of what constitutes the influence

of climate generally upon our organisation. Unless we form to ourselves a clear idea of the component parts out of which climate is, so to speak, engendered, and of the various phenomena which tend to modify it, our estimate of the salubrity or otherwise of a locality must be of a very vague and indefinite description.

In the selection of a climate for all persons, robust or invalid, many circumstances should be taken into consideration besides the mere question of temperature; beyond the fact of the thermometer indicating so many or so few degrees above the freezing point. Temperature, although undoubtedly an important item, is still but one of the many items which contribute to make one place more salubrious or less healthful than another; to point it out as a fitting resort for invalids or as a locality to be avoided even by those in the enjoyment of health.

Much doubtless remains still to be ascertained as to the phenomena which tend to constitute the great diversity of Climate prevalent on our globe, but, of such as are known, the

most important are Light, Warmth, Wind, and the various peculiarities to which the Atmosphere is subjected.

The influence of Light on the human frame is very important and, as it is difficult if not impossible to contemplate this influence on our organisation abstractedly from that of heat, an abundance of the Sun's rays, in which both these agents are united, forms a most essentially constituent part of a health giving climate. Light acts directly on the body as a vital stimulant and indirectly in various ways upon the mind through the sense of vision. Of its power upon our frame we may form some conception by observing the debilitating effect of its exclusion. Blossoms and flowers of plants from which light has been totally shut out are perfectly colourless, and this all in the same degree, without reference to the variety of shades of hue they would otherwise have displayed; and human beings who have endured long imprisonment in darkened cells are recorded as having been invariably found to present a similar colourless and blanched appearance.

We know that the Sun's rays form the most powerful as they are the most necessary vital stimulant for our organisation, but, the precise way in which they act upon our frame or what constitutes their peculiar power has not yet I think been fully or satisfactorily explained. Judging analogically from what we see takes place with respect to inorganic substances, we might assume that light, acting on the skin, exercised an important chemical influence on the transmutation of our food into blood, by promoting active affinity of Oxygen with Carbon and Hydrogen, a combination which it is essential to the maintenance of human life should take place within our organisation. But this explanation, feasible so far as it goes, does not seem to me by any means to embrace or recognise the full extent of the influence of light upon our system, and I cannot doubt that in addition to this chemical influence, it exercises some specific action of a nature still to be discovered, on the cuticle nerves. Hence the fit of sneezing induced by passing suddenly from the shade into sunshine, hence animals in an ex-

hausted state, even when life has become apparently extinct, have been restored simply by free exposure to the Sun's rays, and hence we find persons suffering from scrofula and with weak or debilitated constitutions, so greatly benefited by a residence in a light and open locality: an improvement not merely to be attributed to the greater purity and more bracing nature of the atmosphere but, in part also, to the more general influence of the Sun's rays in such situations.

Of the indirect influence of light by exciting, through the medium of the eye, the observant powers of the mind it is not necessary here to speak. Its importance must be self evident, nor would it be easy to estimate its effect on the human organisation in this respect. It further acts, through the same organ, as a directly and powerfully stimulating agent on the brain, as is shewn by the important part it may be made to play, therapeutically, in diseases of that organ; hence the necessity for its exclusion in brain fever or excessive excitement, while on the other hand I may adduce the improvement observable in cases of nervous depre-

ssion and melancholy by the subjection of the patient to the constant influence of as much bright and cheerful sunlight as possible.

We must consider the effects produced on climate by the peculiarities of atmosphere, in conjunction with the phenomenon of Wind, as the latter, when it prevails, constantly modifies or altogether changes the former, and is as difficult to be separated from it in our analysis, as it is abstractedly to estimate the effect of the warmth of the Sun's rays as apart from their light.

The atmospheric air which surrounds our globe and in which the Earth floats as in an Ocean, is composed of a mixture of Nitrogen, Oxygen, Carbonic and Hydrogen gases, and this mixture exhibits the remarkable peculiarity that, however circumstances may cause the proportion of the two latter gases to vary, that of Nitrogen to Oxygen remains ever unchanged; it is at all times and under every variety of temperature invariably as four to one. To what height the atmosphere may extend, whether to fifty or only to twelve miles as has

been variously estimated, is a matter of pure conjecture, nor will I take up the reader's time by any vague speculation on the subject, thus much is however certain, whatever may be its extent, that, although invisible to human sight the atmosphere is nevertheless a solid ponderous body and perfectly colorless: the beautiful blue we call the sky is not the color of the air, but, is caused by a chromatic action of the Sun's rays on the highly rarefied currents of the upper atmosphere, beyond which, in illimitable space, there is good reason to suppose that all is perfectly dark.

When we reflect that the average pressure of our atmosphere on every square inch of the Earth's superficies amounts to fourteen pounds and a half in weight, and that, on the level of the sea we endure a pressure on our frame amounting to the weight of thirty thousand [pounds: that when the barometer rises or falls one inch so is this weight encreased or diminished by a thousand pounds, and that by every step we ascend from the level of the sea by so much do we reduce this load pres-

sing upon us, we shall at once appreciate how much climate and locality have to do with our general health and well being.

It must not however be supposed that this atmospheric pressure, enormous though it may appear to be, can in all cases be reduced with advantage or even with impunity. Nature's laws are ever beneficent to Man, and in none is a greater regard for the welfare of his economy displayed, than in the phenomenon we are now considering. Were it not for some great and equable weight continuously pressing upon us from without, the various fluids contained within our frame would expand until the vessels which enclose them burst. Hence on ascending to the summit of very lofty mountains, respiration becomes impeded and a painful sensation is experienced; and hence during the prevalence of a thunder storm or rather immediately preceding it, a feeling of lassitude and oppression makes itself generally perceptible. In both these cases the sensation arises from no oppression of the atmosphere but the reverse. The higher we ascend the less dense

does the atmosphere become and the smaller must obviously be its specific column pressing upon us; while at the period of time immediately preceding a storm, the air, being charged to the greatest possible extent with watery vapor, is also far less dense than under ordinary circumstances. In both instances adduced, the usual atmospheric pressure is lessened and the vessels within our frame are thus enabled to expand; producing the sensation of oppression or more properly speaking of fullness which, every one must have occasionally experienced. From precisely the same cause, the popular idea, that, when corns are more than usually painful rainy weather is indicated, is by no means erroneous. The atmosphere, just before it discharges its moisture in the shape of rain, is much lighter than during fine dry weather, its pressure on the cuticle surrounding the corn is of consequence proportionably diminished, thus permitting the expansion of the vessels of the foot, these press against the corn; in itself a hard inelastic substance without any sensation, which stands like a wedge in the

midst of the soft and highly sensitive tissues, and, simply by its passive mechanical resistance, irritates them to a greater or less painful extent.

The weight of the atmosphere encreases as we approach a new moon and again decreases as we recede from a new and approach a full moon: phenomena only recently ascertained and for the discovery of which we are indebted to the researches of the late eminent Dr. Prout. This fact may I think satisfactorily account for the opinion the ancient physicians, many of them men of unquestionable intelligence and ability, used to entertain, that the full moon exercised a specifically exciting influence on persons suffering from mental diseases, and they embodied this idea in the very term they employed to designate persons so afflicted. At the period of a full moon the pressure of the atmosphere on the human frame is absolutely less than at others, and thus the brain of insane persons may then very possibly be more intensely excited, its vessels more enlarged and

gorged than when the atmospheric pressure is greater.

But independently of its weight, the composition of the atmosphere, affects the human health to the last degree; for although the proportion of Nitrogen to Oxygen remains, as I have already observed, ever the same, such is by no means the case with its other constituent parts. Thus in crowded assemblies of the highest and fairest no less than in ill ventilated dwellings of the poor, in Cellars, Mines, Caverns etc the Atmosphere is charged to a deleterious extent with carbonic acid gas, a vapor which, if inhaled alone, would be instantly destructive to human life. In like manner in damp marshy places, the Atmosphere is impregnated with watery vapor, which, by checking the transpiration from the skin, displacing its own weight of Oxygen and thus necessitating the inhalation of a proportionably diminished quantity of that gas, acts injuriously on the human organisation. All these peculiarities are purely local, and, it is by their presence or absence that places are rendered insalubrious or

healthful. By the beneficent laws the all wise Creator has established for directing the economy of our globe, they can never become general, for, when by wind or heat the carbonic acid gas is driven from the place in which it had lodged, it is absorbed by the vegetable creation before a possibility exists of the whole body of the atmosphere becoming vitiated; and with respect to the watery vapors from the Earth, it is calculated that the entire Atmosphere surrounding our globe, is incapable of containing more vapor at any one time, than, when discharged in the form of rain, would exhibit a depth of more than seven inches on the whole of the Earth's superficies.

Temperature exercises a very important influence on the Atmosphere in relation to the health of Man. In warm latitudes and seasons, the amount of Oxygen inhaled is less than in cold ones. The lungs under such circumstances cannot so easily evolve the carbon from the blood; the liver, which, then to a certain extent, acts vicariously for the lungs, is called into unusual requisition, taxed frequently beyond

its powers, and diseased livers in warm climates, bilious complaints during the prevalence of hot weather in moderate ones, are the results. Evils which may be greatly ameliorated by proper regard to diet and regimen. In all warm climates and during the prevalence of hot weather everywhere, much less food and that of a lighter description should be consumed than is requisite when the temperature is at a lower degree. Nature suggests this to us herself by withholding that appetite and relish for eating, which, in colder weather we experience, and, by then producing and offering for our acceptance her many and various horticultural treasures. Europeans going out to reside in tropical climates too frequently neither regard this silent admonition nor the munificent equivalents with which the restriction is accompanied. They find their appetites fail, that they no longer can nor desire to eat as they did at home, and instead of turning to the rich fruits and succulent vegetables of the country, they, to their healths irretrievable ruin, seek to persist in their former diet by exciting their languid di-

gestive organs with spices and stimulants of all descriptions.

It may be asked, how, less Oxygen can be inhaled in Summer than in Winter, if it be true that its proportion as a constituent part of the Atmosphere remains ever unchanged. The explanation of this apparent incongruity will be at once perceived, when it is remembered, that, the particles of which the Atmosphere is composed are subject, like all other matter, to the repelling power of heat and to the attractive power of cold. Hence, a volume of air representing a pound in weight is, by the summer's heat encreased to many times the size it presented during Winter. The same principle is applicable to the explanation of the uniformity of the atmospheric temperature. It may appear strange to my non scientific readers to be told, that, there is no real diversity of temperature in the atmosphere, that everywhere it is perfectly uniform; and yet no philosophic proposition is more true or more easy of proof than this. If a pound weight of air be tested for its heat at the sea side, a second pound weight

at an elevation of half a mile, and a third on the top of a mountain say two miles above the level of the sea, although the encrease of cold in each case will be very evident to the feeling of the experimenter, the thermometer will shew that each pound weight of air tested contains precisely the same amount of heat. Very dissimilar however are the sizes of these successive pounds of air; for the lighter ascending and the heavier air descending, it follows by the laws of gravitation that the air reposing on the Earth's immediate surface must be infinitely denser and, *ceteris paribus*, a similar weight of it consequently occupy a much less space than that on the summit of a lofty mountain. Further, the temperature of the atmosphere is derived directly from the Earth and only indirectly from the Sun. The Sun's rays on their way to the Earth pass through the various currents of the Atmosphere without imparting much heat to them. The Earth absorbs the principal part of the heat conveyed from the Sun and imparts it to the Air lying immediately on its surface: this expands and

rises, carrying with it the heat it has received, which, in its turn, it communicates to the current into which it ascends; and so this process continues until after the setting of the sun the Earth cools so far as to radiate little or no more heat.

As I stated at the commencement of this chapter, one of the greatest modifiers of atmospheric temperature is Wind; and the circumstance whether a locality be more or less visited by Wind, and by what description of Wind, should always be taken into consideration in forming an estimate of its healthfulness. Thus, many places usually favorable to health are, at certain seasons rendered by the Wind unsafe for invalids to remain in: I need but allude to the injurious effect of the sirocco at certain periods in some parts of Italy and the south east of France.

Wind is no doubt one of the causes which contribute to make places, lying in the same parallel of latitude, so diverse in temperature. At the same time the form of the land, its proximity to or distance from the sea, the nature of the soil, the presence of mountains

forests or marshes, all exercise a distinct and individual influence on the climate and temperature of a place. As a general rule it may be considered that Islands and Peninsulas are warmer than Continents but more liable to atmospheric changes, and that the presence of extensive lakes or large inland seas tends to raise the temperature of the country in which they exist.

CHAPTER II.

Climates of particular localities not generally understood. Peculiarities of the climates of England, France, Switzerland, Germany, Italy, Spain, Portugal, Madeira, Malta.

I have dwelt in many lands and made me
With their people not a stranger.

BYRON.

In the selection of a climate for an invalid, all the circumstances to which I have briefly alluded in the preceding chapter, should be taken into consideration, and such only as on scientific principles is calculated in every way to act as counteragent to the disease existing should be recommended by the physician or selected by the patient. It is much to be regretted that so great a want of information or misapprehension on these points should exist among untravelled medical men as is still unfortunately the case. How often are consumptive patients sent „to Italy,“ or are vaguely de-

sired to winter in a warm climate, without any specific direction as to the locality proper to be selected: as if merely to be in Italy were necessarily to be exempt from pulmonary disease, or the foiling the arch enemy of human life were the necessary and certain result of breathing any warm atmosphere. Italy contains within itself many climates, some of them as inimical as can well be imagined to pulmonary patients, others are advisable at certain seasons only but inappropriate at others. From my position as an English practitioner on the continent, resident in a place lying on what may be called one of the high roads to Italy, I have had repeated opportunities of convincing myself of the truth of the observation I have just ventured to make, and it has occurred to me not unfrequently to be consulted by invalids who, having got thus far on their journey, have been startled by the reflexion that although they have followed the advice of their home physician in coming abroad, they are still in unhappy ignorance as to where may be the precise locality to which they should turn with a

reasonable hope of regaining the health they are in pursuit of. Nor should the home medical man permit himself to be too much influenced, as he is very apt to be, by the statistical accounts of health and disease of foreign places which he may read: for it by no means follows that because some of the native inhabitants of a place die from a particular disease, that the same climate must of consequence be without beneficial effect on foreigners suffering from a similar complaint.

We will now glance at the peculiarities of Climate exhibited in the places principally resorted to by invalids in Europe.

Commencing with our own country, it requires but very little consideration to perceive that, Great Britain, from its small extent and insular position, having on the one side the great continent of Europe and on the other the vast Atlantic Ocean, must be necessarily subject to all the influences which render a climate variable and uncertain. The watery vapors rising out of the Atlantic and swept over the land by the West Wind more frequently

than otherwise deposit themselves as rain on their transit. Nor is the influence of the immense ice fields as they float down from the North on the breaking up of the winter unfelt or without effect on the climate of England.

That of London is so far peculiar, in as much as the temperature of the night in that City is somewhat higher than is experienced in the surrounding country whereas by day, the temperature, as compared with the country is rather lower. This peculiarity has been accounted for, and, with much semblance of probability, by supposing that the smoke cloud, which, caused by the innumerable coal fires, ever hangs more or less dense above it, prevents the Sun's rays from penetrating to the earth so readily as they do in the country, hence the colder days; while at the same time it checks the radiation of heat from the earth and causes it to take place at a much slower rate than occurs elsewhere; hence the warmer nights. With all its multifarious disadvantages in respect to the appliances for health, many of which by the way are now being rap-

idly removed, London on the whole, considering the mass of its population cannot be regarded as other than a healthy capital. Its elevated position, the number and extent of its parks and squares, the breadth and rapidity of its noble river, all tend, notwithstanding the defect of its sanitary regulations, to render it a much less insalubrious capital than many on the continent of Europe of not a twentieth part its population.

The south west and west of England possess unquestionably the mildest climate in Great-Britain, but even within so limited a space as that from the isle of Portland to the Severn the greatest difference prevails; not so much perhaps in respect to temperature, as in the amount of vapor the atmosphere contains. My space will permit me to touch only briefly on the peculiar characteristics of some of the principal places in the district indicated.

Salcombe, has the warmest winter of them all, but at the same time its atmosphere is moist to a degree of humidity. Torquay and Dawlish, are drier and not quite so warm, and

their climates present, — the former especially —, many advantages for persons whose respiratory organs are weak and delicate. Exmouth and Sidmouth, are both subject to fogs and raw winds, rendering them but ill adapted generally as residents for invalids. Penzance, has a mild and moist winter climate, but, in the spring a north east wind prevails to an injurious extent, rendering that season peculiarly raw and ungenial. Clifton, possesses on the whole by far the best climate of any place in the west of England; it is drier in proportion to its warmth, and consequently far less relaxing in its effects, than the other places in this district I have mentioned.

The climate of the south of England, cannot be said to differ greatly from that of London itself. The summers are, on the average perhaps, a little cooler, and the winters somewhat warmer than in the immediate vicinity of the metropolis; but the excess either way is certainly not to any important, extent. The places lying between Hastings and Southampton, must be all considered as possessing a much

more bracing climate than any I have yet enumerated. Hastings, sheltered as it is from the North, is thought by some medical practitioners an advisable place of residence during the winter for incipient consumptive patients. I confess I do not consider it so, nor would I recommend the south coast to any such invalids.—Where however it is a question of mere delicacy of constitution requiring an invigorating climate, then Hastings may be suggested, as possessing this desideratum to a moderate degree, well adapted for those, who, may be too feeble or enervated to bear the more bracing atmosphere of Brighton: its spring is however raw and cold and should be carefully avoided. A residence in Brighton during the Autumn and early Winter has a remarkably invigorating and tone giving effect in cases of Scrofula and relaxed constitutions generally, and I have known many Europeans, returning in this condition after a residence in India, who have been indebted for the re-establishment of their health simply to the bracing atmosphere of Brighton, having previously, wandered from one mineral

spring to another without advantage or relief. Taken as a whole however, I consider the so called back of the Isle of Wight, as Undercliffe for instance, to be one of the most salubrious localities in Great Britain, and from its mild and equable climate may be safely suggested as a residence for even delicate persons throughout the entire year. With a climate which varies but little in mildness from that of Torquay it presents the desiderata of being far drier and less relaxing.

FRANCE.

The portions of France more especially selected as residences for invalids are the south-West and south East. The climates of these two divisions are very different and in no degree suited for similar complaints. The former has a mild, moist, and relaxing climate, not greatly dissimilar to that of Devonshire, adapted for consumptive patients and such as are suffering from bronchial affections or chronic

diseases of the respiratory organs characterised by excessive dryness of the skin. Of the numerous places in the south western division to which this character applies, may be enumerated Tours, Limoges, Bordeaux &c.

The south eastern division on the other hand possesses a hot, dry, and stimulating climate, favorable for torpid and relaxed constitutions but most injurious to persons suffering from the diseases already mentioned. From want of due information on this important point, English physicians were long in the habit of sending consumptive patients to Montpellier, under the supposition that the warmth of the climate must be necessarily advantageous to them: not taking into consideration the irritation to the respiratory organs produced by the extreme dryness of the Atmosphere and the not unfrequently, piercing character of the wind. — A fatal mistake which, must have often been the means of accelerating the result sought to be avoided — Montpellier, Nismes, Avignon, are all unsuited to pulmonry complaints.

The district of the Pyrenees deserves a

particular mention, as, its climate differs materially from that of its neighbouring plain. It is much drier, less warm, and less windy, but at the same time its weather is more subject to change. — Warm bright sunshine and smart showers alternate with great rapidity, but, except during Spring and Autumn no great amount of rain, in the aggregate, can be said to fall. On the whole, the climate of this locality is bracing and healthful, for such persons as are not already too weak to endure a mountain air. The Bagneres de Bigorres, in the upper Pyrenees, from the commencement of June to September has a mild climate, of moderate and tolerably equable temperature, suitable for incipient consumptive patients.

A word a two on Nice must close my brief sketch of the climate of France.

This favorite winter residence is not, in my opinion, at all advisable for persons suffering from already deposited tubercle, and still less where the mucous membrane of the throat and chest is irritable and excited. In cases of scrofula, diseases of the bronchial tubes cha-

racterised by excessive relaxation and expectoration, or where the digestive organs are torpid or inactive, Nice may doubtless with great advantage be resorted to. Its climate is mild and the temperature steady, but, the peculiarity which renders it, I think, inappropriate for the class of patients first enumerated is, the extreme dryness and stimulating nature of its atmosphere.

SWITZERLAND.

The climate of Switzerland is far too bleak, to render any part of that exquisitely beautiful country, a fitting residence for persons suffering from diseases of the chest, except during the months of July and August. The proximity to the glaciers and the eternal snows of the higher Alps, renders at all times the air too keen and piercing for tuberculous patients. For all however who require or can bear a sharp, thin, bracing atmosphere, that of Switzerland is doubtless beneficial. Bevay is its warmest place, but

Interlacken, Lausanne and Geneva are all tolerably sheltered and certainly healthful localities.

GERMANY.

Germany may be briefly described as an immense country divided naturally into a northern and southern portion. The former composed of vast tracts of plain, marsh and moorland, unbroken by hill or elevation of any kind; and the latter, of ranges of countless mountains, stretching from the southwest to the northwest. The characteristics of the climate as well as the aspect of the two divisions are therefore essentially different.

With respect to the climate of North Germany, little need be said. This division is not attractive, for its natural beauty, to persons even in robust health, and cannot be described as presenting any feature which might render it suitable for invalids.

In South Germany however, the case is very

different. Here, Nature has indeed been prodigal of her bounties. An endless variety of hill and dale, wood and water, presents to the eye a diversity of scenery, which, for extent, may be sought for elsewhere in vain. A summer's sun, which, for a few weeks, equals in intensity that of Italy. Sheltered vallies, where, the severity of a harsh winter loses much of its intensity, and, numberless mineral springs, in the alterative and restorative qualities of which, thousands of invalids yearly, find relief from their sufferings; combine to render it one of the most favored countries of the Earth. Of the localities possessing climates favorable for invalids, and particularly invalids suffering from chest or throat affections, I may mention Freiburg Baden-Baden and Wiesbaden. When incipient tubercle exists Baden-Baden may with great propriety be recommended as a Summer and Autumnal resort, while in cases of relaxed, mucous membrane of the throat and bronchia, Wiesbaden may I think, with much advantage be selected as a Winter residence. Heidelberg may be mentioned as a healthful place during

the Summer and Autumn; its Spring and Winter should however be avoided by the invalid. Both these seasons are cold and raw, and the East Wind sweeping down the narrow valley of the Neckar, renders them trying even to persons in good health. A sojourn of any duration at Munich is also to be guarded against. It is much to be regretted that this magnificent capital should have so pernicious a climate as it unfortunately possesses. Broad airy streets of palaces rather than houses, galleries replete with works of art of every possible description; it is difficult for a stranger to conceive that anything so extremely beautiful can be other than healthful, the reverse is however the fact, and, more than a very brief residence in Munich should never be advised.

ITALY.

We will now consider the, peculiarities of climate of that country, to which more invalids resort for the mere sake of climate, than pro-

bably to the whole of the rest of Europe, and here I would venture to repeat, what I have already observed but on which too much stress cannot be laid, that Italy is not subject to one form of climate only but to the greatest variety; some of them no doubt adapted to check the progress of pulmonary disease, others however no less certain to accelerate it: that some of them at certain seasons of the year exercise a beneficial, at others an injurious effect on the constitutions of invalids generally; and that even when the home physician is master of these particulars and feels himself competent to advise as to the localities to be selected, he must send his patients, if he would have them derive real and permanent benefit from the change of climate, at as early a stage of disease as possible. But little advantage need be anticipated if the journey be delayed until medical skill at home is found to be unavailing. Patients sent abroad simply as a *dernier resort*, I may venture to affirm, will experience no ultimate improvement, to whatever country or locality they may travel: on the contrary,

the excitement and fatigue of the journey will, under such circumstances, be ever found to exercise proportionately a more injurious influence on the system than the slight and temporary amelioration in the disease a warm climate is then able to effect. One other point to be carefully observed, is, the length of time, a patient suffering from disease of the heart or lungs, should remain under the influence of a milder climate. One winter only, can be of little service: a shorter period than a year need not, under the most favorable circumstances, be expected to produce any permanent improvement; and even this period will not unfrequently have to be extended to three or four. As a general rule, I may say, the patient should remain for some months after every symptom of his disease has disappeared, nor, whatever may be the mere improvement in his symptoms, can he with confidence conclude, that, his disease is really cured, until he begins to regain whatever flesh and appearance of health, he may have lost.

Venice is, I think, remarkably well adapted

as a residence for invalids in the earlier stage of tubercle, and it seems to me much to be regretted that it should hitherto have been so little recommended. The climate is mild and, still at the same time, not so relaxing as that of the more southern parts of Italy; while its sea breezes impart to the constitution of the patient, a tone and strength replete with the happiest consequences.

Rome, during the Winter and Spring, has, as a whole, the best climate and is then one of the most healthful places in all Italy. Its Summer and Autumn are however as insalubrious. During its two favorable seasons the climate is mild, somewhat relaxing perhaps but dry, and with a singular equability of temperature and steadiness of weather. For tuberculous patients, I should consider, a residence in Rome during the Winter and Spring, and in Venice or the baths of Lucca during the Summer and Autumn, would have the greatest probability of being attended with favorable results.

For invalids suffering from pulmonary disease of any kind, Naples possesses probably the

most unfavorable climate in Italy, and the condition of patients, sent there under such circumstances, cannot but be materially injured. It has a temperature not unfrequently tropical in its heat, but subject to the most sudden and frequent changes, with a parched and irritating atmosphere in Summer exceedingly distressing to the invalid.

Florence is at all seasons unfitted for persons out of health. Munich has been called the Florence of Germany in respect to its artistic treasures; Florence may as appropriately be denominated the Munich of Italy as regards its insalubrity; nor would I under any circumstances venture to recommend it to persons of delicate constitutions.

Pisa, although not so warm as many other parts of Italy, has a healthful climate well suited for pulmonary patients, and, the depressing effect which some invalids experience from the climate of Rome, is here not perceptible. For such persons, the substitution of Pisa for Rome as a Winter and Spring residence may be suggested.

For scrofulous patients, but by no means when tubercle deposit has taken place, and for all not afflicted with any special or organic disease, Genoa, is probably as advisable a residence as can well be selected in Italy. It has a dry, stimulating, and at times, almost sharp and bracing climate, eminently healthful where tone is required and atmospheric stimulant able to be borne.

SPAIN AND PORTUGAL.

These countries are but very occasionally resorted to by invalids in search of health, and, in the absence of better information with respect to the influence of their climates on particular diseases, than we at present possess, it is not advisable they should be recommended.

Madrid, from its elevated position, is subjected during Winter to such an amount of cold and to such piercing winds, as render it, at that season, one of the most inclement capitals in Europe, while, in the Summer, its heat is as intensely oppressive.

Cadiz, being, so to speak, almost a peninsula; its temperature is materially modified by the breezes from the sea, almost surrounding the city. In this respect it would seem to possess some claim on our consideration, but so many of the localities I have enumerated are in possession of this as well as other known advantages, that, it would be preposterous to advise invalids to go to Cadiz merely for the benefit to be derived from its sea breezes.

Portugal is said to have an exceedingly mild warm climate but subject to frequent and sudden changes, a peculiarity which, of itself, would render it inadvisable for the weak and delicate.

A glance at the Islands of Malta and Madeira, must conclude this cursory notice of the Climates of the principal resorts of invalids in Europe.

MALTA AND MADEIRA.

There can be but little, or rather, there can be no doubt, that, a permanently beneficial result of change of climate for tuberculous pa-

tients, is to be anticipated where an undeviating steadiness of the atmosphere prevails; rather than, where the temperature is merely raised to a considerable elevation above what the patient has been accustomed to experience at home. Hence, as we have seen, when considering the climate of Italy, it is by no means the warmest localities which are the most favorable for such invalids. Further, in that form of disease denominated as scrofula, and in relaxed conditions of the laryngeal and pectoral mucous membrane, a drier, more bracing and stimulating atmosphere is required, than is appropriate after tubercle deposit has taken place. If we turn to the two islands, Malta and Madeira, differing from each other as they so essentially do in their climates, we shall find their respective influence on the diseases alluded to, in keeping with, the requirements I have mentioned. Each island possesses a climate remarkably steady and equable, but, with the essential difference between them that, that of Malta is much drier, more stimulating and, it may be, more irritating to the respiratory or-

gans, than that of Madeira; and experience has amply shewn, that while great benefit results to patients suffering from the diseases first mentioned, by a residence at Malta, the advantage accruing to those afflicted with tubercle is more than doubtful. On the other hand we find at Madeira a climate, far more efficacious in checking the progress of, and in radically curing pulmonary consumption, than any other within our reach.

In Madeira, the temperature never either rises or falls to an inconvenient degree of heat or cold, and its difference by day or night is very inconsiderable. The consumptive invalid is therefore subjected to no trying variations during the whole twenty four hours, or indeed entire year; a desideratum which renders its pre-eminence as a resort for such individuals beyond all question of rivalry.

OBSERVATIONS

ON CERTAIN

PHYSIOLOGICAL PHENOMENA.

CHAPTER III.

Necessity for eating. Product of the blood. Composition of the Blood. Process of digestion. Formation of Chyme and Chyle. Circulation of the blood.

There are more things in Heaven and Earth.

Than are dreamt of in Philosophy!

SHAKSPEARE.

That man must eat to live, is an observation, so old as to have become trite, and contains a proposition, the truth of which, is doubtless felt to be indisputable by the youngest and least erudite of my readers. But why this must be so; and in what manner the effect produced is consequent on the cause stated, are questions which require the scientific

researches of the chymist and physiologist to determine. It is my purpose to endeavor to give some explanation of this universal law, which prevails throughout the animal creation, and to elucidate the complex phenomena which ensue on the consumption of our daily food.

Two distinct but simultaneous processes are constantly going forward within the organisation of every adult; vizt. The maintenance of his frame as it now exists, and, the production of the, so called, animal heat, by which that frame is warmed. When either, or both, of these processes cease to be evolved, the complete extinction of the vital principle, or, to speak more popularly, the phenomenon known as death, ensues. When this catastrophe takes place irrespective of disease or accident, but, simply because sufficient material has not been introduced into the system to enable the two processes, which I shall presently describe, to be carried out, then do we more particularly define the cessation of life, as, resulting from inanition, or death from starvation.

To one of the phenomena it will be obser-

ved, I have applied the term maintenance; and I have done so, because, although after its arrival at maturity, the human frame requires no addition to the many and various structures of which it is composed, still, those structures, marvellously tough and admirably adapted to the purposes for which they are intended though they be, are subject, like any inanimate, machinery, to the laws of wear and destruction, and, unless kept in constant repair by the continuous but imperceptible renewal of their material, would ultimately become incapable of performing the functions assigned by Nature to them. We will now endeavour to ascertain, in what manner, this maintenance of our frame in all its integrity, and the keeping that frame at a certain equable temperature, altogether independent of external heat, is connected with the simple act of eating; what they can possibly have to do with that strange medley which constitutes our daily food.

Every portion of the human structure, however diverse from the remainder it may appear to be; whether it assume the semblance of bone,

flesh, nerve, skin, hair or nail, is solely and equally a product of the blood. From this fluid they all derive their origin, and by it, they are all nourished and maintained. Thus much being premised, my task will be greatly simplified by shewing, how the blood itself is formed from the food we eat.

This life essential fluid, is of a very composite nature, and, by no means the simple red liquid it appears to the eye of the uninitiated observer. When viewed through a microscope, it is found to consist of two distinct parts, vizt. bright red globules, and, a colorless fluid in which those globules float. Chemically analysed, so far as the present state of that science admits, healthy blood is composed of certain salts, acids, iron, carbon, oxygen, and water; the proportion of the latter being 79 in every 100 parts. It must be evident that, our food, to be of any use as an elementary basis for this very complicated liquid, must bear some analogy to one or more of the ingredients contained in it; must be enabled to be assimilated with it; must possess the faculty of being con-

verted into it: and by far the larger proportion of things consumed as human food do contain several, some nearly all, of these elementary ingredients.

We will now ascertain how a solid slice of meat becomes converted into bright, red, limpid blood.

The first operation, leading to this marvelous transformation, is the one popularly known under the name of digestion. The meat, through the agency, of the teeth and saliva, arrives in the stomach as a soft pulpy mass. Here it becomes intimately mixed up with and acted upon, by a secretion of the coats of the stomach, an acidulous and powerfully solvent fluid, called by medical men, from the seat of its secretion, the gastric juice. This fluid, chemical analysis shews us, is composed of a considerable amount of muriate of soda or common salt; other salts in smaller proportions; an organic matter, of the precise nature of which we at present know very little, but to which, as it appears to play the principal part in the digestive process which goes on in the stomach,

the term Pepsin has been applied; and finally a free acid, apparently identical with the muriatic acid we can manufacture. This gastric juice acts, as I have said, chemically on the food, as a solvent, assisted by a slow muscular contraction and relaxation of the stomach itself.

After an interval of longer or shorter duration, varying according to the description of the food eaten, but, averaging from three to four hours; the latter becomes transformed into a greyish colored mass, scientifically called Chyme, from a greek word signifying juice, because it is, so to speak, the juice of the food. In this state, it passes into the intestines, is there further acted on by secretions from the Pancreas, popularly known as the Sweetbread, from the Liver, and from the Intestines themselves, until every portion of it which contains nutritive principles, has become converted into a liquid, which, according to circumstances, may be either more or less white, grey, or yellow in color, and which is sucked up by innumerable minute vessels disseminated throughout the course of the intestinal canal. This liquid is called

Chyle, a word also derived from the greek and indicating an extracted or expressed juice. It is conveyed by the little vessels alluded to, to the Thoracic duct, a long canal, running on the inner surface of, and hence protected by, the Spine, and is eventually discharged into the vital stream flowing through the Jugular vein.

We have thus traced the conversion of a solid into a fluid; of food until it becomes a part of, or rather the element of, our blood. For the fresh lymph does not immediately on its junction with, become an integral part of, the latter. It floats in and with it for some time, undergoing a species of growth, until it eventually ripens into perfect and mature life sustaining blood.

As I have stated that, it is by this fluid alone, the whole of our frame is nourished and maintained; it may be interesting to the reader if, I briefly describe the systematic manner in which it is made to irrigate every portion of our structure.

Human beings have, in common with all other Mammifera, two distinct circulations of

the blood. A greater and a lesser. The former from and to the heart and every portion of the frame, and the latter between the heart and lungs only. The principal agent in effecting these circulations, is the heart, assisted, to a certain extent, by a continuous contraction and expansion of the Arteries. This mechanism of the heart, if I may so call it, is a wonderful monument of the wisdom and providence of the divine Creator, and not the least of the many, which teach us, „how fearfully and wonderfully we are made.“

Our heart is divided into two tolerably equal parts, by a partition extending from top to bottom, and again, into two unequal parts by a cross division. So that, the whole organ is divided into and exhibits, two smaller cells, standing immediately above two larger ones. The former are designated as the right and left Auricle, the latter, the right and left Ventricle. The Arteries which convey the blood from the heart, rapidly divide into stems and offshoots and thus radiate over the body and extremities. The Veins however which bring the

blood back again to the heart, differ materially from this arrangement: dividing, not out of trunk stems into branches but out of branches into stems. Thus at a distance from the heart, the veins are exceedingly numerous and minute; as they approach that organ however they gradually combine and, eventually enter it in the form of two very large canals.

The connecting links between the Arteries and Veins, the ducts which form the junction, between the blood flowing from, and that returning to, the heart; consist of a net of innumerable vessels, called, from their extremely small and hair like minuteness, Capillaries.

Each Auricle and Ventricle is furnished with a distinct valve by means of which it can open and close its cavity. The two ventricles by a strong muscular contraction, draw themselves together and thus eject the blood they contain. Simultaneously with this movement the valves of the Auricles open and admit into those divisions the blood discharged from the Ventricles. On the other hand, when the Auricles contract and eject their contents, the

valves of the Ventricles open to receive it. But although the two auricles and the two Ventricles thus work together, the two of each kind are in no way connected with each other but with the other division above or under which it stands. Thus, the left Auricle and Ventricle are exclusively engaged in expediting the blood about to commence the circulation of the system, while the right Auricle and Ventricle receive it on its return.

Thus much being stated as to the machinery itself; We will now take a glance at it while at work, and observe the operation effected by its instrumentality.

The blood sets out from the heart in its journey through the system bright and red in appearance and replete with all the requisite nutritive properties. It proceeds, from the left Ventricle, through its channels the Arteries, to the various organs, structures and extremities of our person; Deposits, by oozing through the skins of these Arteries, the material requisite for repairing the expenditure of the old by

the formation of new substance, and, having achieved this great work, is brought back to the heart by means of the return channels, the veins, through the medium of the connecting little ducts, the Capillaries, already alluded to.

In performing the operation just described, the blood gradually loses its life giving properties, becomes charged with an excess of Carbon, so that, by the time it re-enters the heart, which it does by the right Auricle, it is no longer red but almost black. In this state it is not simply incapable of being of service to us, but it is in the highest degree injurious. Hence the necessity for the second or lesser circulation, which takes place between the heart and lungs only.

The black blood from the veins having entered the heart by the right Auricle, is immediately pumped into the right Ventricle, which, having a direct communication with the lungs, forces it at once into and through those organs. There, it becomes acted on by the air we inhale, a chemical change and purification takes place, we exhale its carbon, and, it

re-enters the heart by the left Auricle, bright and red as at first described. And these two systems of circulation are repeated with every breath we draw; with every beat our heart makes.

CHAPTER IV.

Animal heat, what caused by and how evolved. Explanation of Combustion. Substances which encrease Animal heat. Consequences attendant on taking too many of them. Combustion continuous through life.

Effect of Carbonic acid gas. Difference between Animal and vegetable creation. Substances which support the frame.

Oh! Day and Night! but this is wondrous strange!

SHAKESPEARE.

Something more is however required from the food we consume than the mere maintenance of our corporal frame. It is not sufficient that it is capable of keeping up our supply of blood. It must, over and above this, possess the faculty of imparting to that fluid a certain temperature of its own, perfectly irrespective of external heat or cold. A temperature which, in a healthy state of the individual, displays scarcely any difference whether in the torrid or frigid zone; in the veins of the Laplander or beneath the scorched skin of the African.

What is this phenomenon we call animal heat? Whence does it arise and in what manner is it continued? It has its origin in combustion. It is in plain language, a fire, which, is blown into existence by the first breath the infant draws, and remains unextinguished so long as that breath continues to respire.

To make this more clearly understood by such of my readers as may have paid but slight attention to the study of the natural sciences, I will briefly explain, what combustion is, why an ordinary visible fire, say a wood fire, burns and gives out heat.

Every substance, with which we are acquainted, contains within itself a certain amount of heat, latent or apparent. This is one of the great laws of Nature, to which no exception has yet been found, and, were it not irrelevant to my subject, I could shew, that ice itself is subservient to this rule.

Wood then contains, shut up within its fibres, a certain amount of latent heat. To set this latent heat free, to make it apparent, so that we may derive benefit and enjoyment from

it, it is necessary that the wood should undergo a great change; that the chemical elements of which it is composed, should be rearranged.

All matter is resolvable into certain substances, which, from themselves being irresolvable, are called chemical elements. Hence we describe the Air we breathe, as being principally composed of Oxygen and Nitrogen, we say Water is a mixture of Oxygen and Hydrogen and, to return to my subject, that Wood, is a compound of Carbon and Hydrogen. Now Carbon and Hydrogen are essential elements to combustion. The former yields the substance to be acted on, the latter is the active agent or burning principle. But this principle cannot develop itself, except, in an atmosphere of Oxygen. The air supplies this necessity. We have now the three essentials for producing combustion. The matter to be acted on, the acting principle, and, the atmosphere in which that principle can exist.

We apply a lighted match to our wood. The Hydrogen gas is set free. It imme-

diately unites with the Oxygen contained in the air and bursts into a flame; this flame consumes the carbon of the wood and disperses it into the air as carbonic acid gas, The latent heat, contained, partly in the wood partly in the atmosphere, is set free by the re-arrangement of their elements consequent on their action on each other, and we become sensible of its presence, we experience the warmth of the fire.

Precisely the same process is constantly occurring within our circulation. The Carbon and Hydrogen contained in the food we eat, are carried into our blood, in the manner I have described, They there combine with the Oxygen introduced into our system from the atmospheric air by the act of breathing, Combustion ensues, and heat is evolved. This heat may be encreased by violent exercise, because, our respiration is thus accelerated and our lungs introduce a more than usual amount of Oxygen into our blood. In the same way and for a similar reason an ordinary fire burns more swiftly when an accelerated current of air is brought

to bear upon it through the instrumentality of a pair of bellows.

From this theory it is evident, that, such substances as contain the greatest amount of Carbon and Hydrogen in their composition, must produce as the result of their consumption by us, the greatest amount of animal heat. Hence ardent spirits, which are composed almost entirely of those chemical elements, are found to be the most rapid evolvers of this phenomenon, and, looking at the matter in a philosophic point of view, the propensity to indulge in these stimulants, so much more observable in Northern nations than among the inhabitants of warmer latitudes, must I think be rather regarded as a natural instinct than a vice, properly so called. The articles of food which more especially serve as fuel for our internal fire, are briefly, the fat of meats; greasy substances of all kinds; the majority of vegetables; all vegetable gelatinous substances as Sago, Tapioca; everything containing starch, as Potatoes, Arrowroot; all containing Sugar or

the produce of sugar, Alcohol, as Wine, Beer, Spirits.

It may be asked, what is the consequence of introducing into our system more of these combustible materials, than is requisite to supply the amount daily required to be consumed: in other words, what ensues if we heap on more fuel and make a greater fire than is absolutely necessary? We then either become ill, as bilious, inflamed, feverish, and so on; or, the unconsumed surplus is deposited between the muscles and external skin in the form of fat, which, is only then called into requisition when the supply from without falls below the demand.

This fat, when not in excess, answers many useful purposes, and, there are localities in which it is essential a certain amount should exist. It acts as a soft pad and protection for the muscles and soft tissues, thus, in the palm of the hand, sole of the foot, socket of the eye &c. a greater or less amount of fat is ever found even with the thinnest persons. Another useful property of fat is, that, being in itself, an extremely bad conductor of heat,

it protects our systems from the external cold; and it may be always observed that obese persons are able to endure cold better and are in every way less susceptible to its influence than thin ones.

It is a primary law of our organisation, that, combustion shall commence with the first breath of life, and can only cease with life itself. Abstain from feeding the fire I have described and it commences to prey upon our frame itself: first the superabundant fat is consumed, then the greater part of the muscles and tissues, and, before an animal dies, exhausted from starvation, it presents the frightful picture of extreme waste of organic matter: a literal skeleton, covered by little but its skin.

In my description of what takes place in the visible combustion of a wood fire, I mentioned the generation of carbonic acid gas; a noxious poison, into which the burning material is transformed; and it may be enquired, how, if the combustion going on within us be analogous, can the presence of this gas be compatible with the maintenance of human life? The

Almighty, in his arrangement of the natural phenomena, has beneficently provided for this difficulty by creating a great physiological bar of distinction in the organisation of the animal and vegetable Kingdoms. The former inhales Oxygen and exhales Carbon: the latter inhales Carbon and exhales Oxygen: thus, at every inspiration, We fill our lungs with a life supporting element, while at every expiration, We discharge from them that, which, to retain, would cause our death.

As a familiar exemplification of this, I may refer to the headach and other injurious effects produced by a long continuance in a crowded or ill ventilated apartment, this is simply a partial commencement of that catastrophe, the complete whole of which is displayed in the french form of suicide by the inhalation of the fumes of Charcoal. These fumes and the vitiated atmosphere of a crowded Assembly are both charged with one and the same poisonous gas.

I have thus endeavored to trace the progress of the two processes ever going on with-

in us and for which it is ordained that man must eat. The same description of aliment does not apply to both, and, if we ate only such as tended to maintain our animal heat, we should as surely die from exhaustion, as if we abstained from nutriment altogether.

Milk is the only description of food, which, in its constituent elements, contains materials requisite for both systems. The lean of meat; Eggs, Fish, Muscular fibres generally, Animal gelatinous substances, Certain vegetables as beans and peas; these form the elements out of which the nutritive and creative properties of the blood are produced and by means of which our frame is kept in being. The happy and judicious mixture of this class with the one previously described, produces the strong man, glorying in his strength; the hale and green old age „drooping but sturdy.“ —

WORKS BY THE SAME AUTHOR.

PREPARING FOR PUBLICATION.

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